

What Is Claimed Is:

1. A display method for a navigation system, comprising the following steps of:

5 receiving a scroll signal from an input device operated by a user for scrolling a screen of a navigation system;

10 detecting a condition in which blank scroll will arise when the screen is scrolled, where the blank scroll is a situation of the screen which does not show any visible object thereon;

reading map data ahead in a scroll direction to find any visible object when the blank scroll condition is detected;

15 evaluating a shape point on a visible object to determine whether any part of the visible object should come within a display range of the screen when the screen is further scrolled; and

20 jumping to a location which shows the visible object when it is determined that any part of the visible object should come within the display range.

2. A display method for a navigation system as defined in Claim 1, wherein said step of detecting the blank scroll condition includes a step of scanning the screen to see if there is any color difference on the screen, and if there is not a sufficient color difference, it is determined that the blank scroll condition exists.

3. A display method for a navigation system as defined in Claim 1, wherein said step of detecting the blank scroll condition includes a step of examining map data for the screen to see if there is any data showing a visible object within the display range of the screen, and if there is not the map data showing the visible object, it is determined that the blank scroll condition exists.

35 4. A display method for a navigation system as defined in Claim 1, further comprising a step of repeating said steps

of reading the map data ahead in the scroll direction to find any visible object and evaluating a shape point on the visible object until a visible object that should come within the display range is detected.

5 5. A display method for a navigation system as defined in Claim 1, further comprising a step of stop scrolling the screen even if the scroll signal is provided by the user, a step of repeating said steps of reading the map data ahead in the scroll direction to find any visible object and
10 evaluating a shape point on a visible object until a visible object that should come within the display range is detected, thereby jumping to the location which shows the visible object within the display range.

15 6. A display method for a navigation system as defined in Claim 1, wherein said step of reading the map data ahead in the scroll direction includes a step of determining the scroll direction based on the scroll signal generated by the input device.

20 7. A display method for a navigation system as defined in Claim 1, wherein said step of evaluating the shape point on the visible object includes a step of drawing lines from the screen defining a display range of the screen if the screen is scrolled in the scroll direction and a center line from a center of the screen toward the scroll direction.

25 8. A display method for a navigation system as defined in Claim 1, wherein said step of evaluating the shape point on the visible object includes a step of evaluating a plurality of shape points on the visible object to determine which part of the visible object should come within the
30 display range when the screen is scrolled in the scroll direction.

35 9. A display method for a navigation system as defined in Claim 1, wherein said step of evaluating the shape point on the visible object includes a step of drawing a first line from one corner of the screen which is one end of the display

range to the shape point and a second line from another corner of the screen which is another end of the display range to the shape point, and a step of evaluating an angle α made by the first line, an angle β made by the second line,
5 and an angle θ of the scroll direction for determining whether the shape point will be within the display range when the screen scroll is continued.

10 10. A display method for a navigation system as defined in Claim 9, wherein said step of evaluating the angles includes a step of determining that the shape point will not come within the display range if a relationship of " $\alpha > \theta$ and $\beta > \theta$ " or " $\alpha < \theta$ and $\beta < \theta$ " is satisfied.

11. A display apparatus for a navigation system, comprising:

15 means for receiving a scroll signal from an input device operated by a user for scrolling a screen of a navigation system;

20 means for detecting a condition in which blank scroll will arise when the screen is scrolled, where the blank scroll is a situation of the screen which does not show any visible object thereon;

means for reading map data ahead in a scroll direction to find any visible object when the blank scroll condition is detected;

25 means for evaluating a shape point on a visible object to determine whether any part of the visible object should come within a display range of the screen when the screen is further scrolled; and

30 means for jumping to a location which shows the visible object when it is determined that any part of the visible object should come within the display range.

12. A display apparatus for a navigation system as defined in Claim 11, wherein said means for detecting the
35 blank scroll condition includes means for scanning the screen

to see if there is any color difference on the screen, and if there is not a sufficient color difference, it is determined that the blank scroll condition exists.

5 13. A display apparatus for a navigation system as defined in Claim 11, wherein said means for detecting the blank scroll condition includes means for examining map data for the screen to see if there is any data showing a visible object within the display range of the screen, and if there is not the map data showing the visible object, it is
10 determined that the blank scroll condition exists.

14. A display apparatus for a navigation system as defined in Claim 11, further comprising means for repeating said processes of reading the map data ahead in the scroll direction to find any visible object and evaluating a shape
15 point on the visible object until a visible object that should come within the display range is detected.

15. A display apparatus for a navigation system as defined in Claim 11, further comprising means for stopping the screen scroll even if the scroll signal is provided by
20 the user, means for repeating said processes of reading the map data ahead in the scroll direction to find any visible object and evaluating a shape point on a visible object until a visible object that should come within the display range is detected, thereby jumping to the location which shows the
25 visible object within the display range.

16. A display apparatus for a navigation system as defined in Claim 11, wherein said means for reading the map data ahead in the scroll direction includes means for determining the scroll direction based on the scroll signal
30 generated by the input device.

17. A display apparatus for a navigation system as defined in Claim 11, wherein said means for evaluating the shape point on the visible object includes means for drawing lines from the screen defining a display range of the screen
35 if the screen is scrolled in the scroll direction and a

center line from a center of the screen toward the scroll direction.

5 18. A display apparatus for a navigation system as defined in Claim 11, wherein said means for evaluating the shape point on the visible object includes means for evaluating a plurality of shape points on the visible object to determine which part of the visible object should come within the display range when the screen is scrolled in the scroll direction.

10 19. A display apparatus for a navigation system as defined in Claim 11, wherein said means for evaluating the shape point on the visible object includes means for drawing a first line from one corner of the screen which is one end of the display range to the shape point and a second line
15 from another corner of the screen which is another end of the display range to the shape point, and means for evaluating an angle α made by the first line, an angle β made by the second line, and an angle θ of the scroll direction for determining whether the shape point will be within the
20 display range when the screen scroll is continued.

25 20. A display apparatus for a navigation system as defined in Claim 19, wherein said means for evaluating the angles includes means for determining that the shape point will not come within the display range if a relationship of " $\alpha > \theta$ and $\beta > \theta$ " or " $\alpha < \theta$ and $\beta < \theta$ " is satisfied.